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IODE XXIII Inter-Sessional Working Group to Propose a Restructuring of IODE

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[1] http://www.oceanexpert.net/viewMemberRecord.php?&memberID=707
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[4] http://www.oceanexpert.net/viewMemberRecord.php?&memberID=3450
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[6] http://www.oceanexpert.net/viewMemberRecord.php?&memberID=6552

Executive Summary

The International Oceanographic Data and Information Exchange (IODE) program has been exploring options for improving its services to the ocean data and information community. It is mission critical important that IODE improves in the short-term its international role, engagement strategy, and leadership particularly in those areas where IODE has strong capacity to support without competing with other international organizations. This report provides relevant and actionable strategies responsive to the evolving needs of the IODE ocean data and information community: (a) an adaptable strategic plan, (b) a process-oriented and peer-reviewed funding cycle for IODE projects and activities, (c) a responsive IODE management group to recommend, track, and execute approved IODE committee work plans, and (d) developing a sustainable budget strategy for IODE. It will be important to focus first on the high-value strategies that lend themselves to achieving incremental measurable progress over the 2017 and 2019 intersessional periods. The path forward strategies here discussed are offered for consideration to the IODE XXIV committee for approval in 2017 and implementation at the earliest most practical time.

Introduction

The International Oceanographic Data and Information Exchange (IODE)[7] program of the Intergovernmental Oceanographic Commission (IOC)[8] of United Nations Educational, Scientific and Cultural Organization (UNESCO)[9] was established in 1961. Since its inception, IODE has played a positive role to the service of the international ocean community by facilitating the exchange of oceanographic data and information between participating Member States with the goal of meeting the needs of users for data and information products. During this time, many national data and information managers have voluntarily committed time and effort to helping coordinate oceanographic data and information management at a national, regional, and global scale.

The IODE network of data and information centers provides or endorses several value added products and services[10] including the internationally recognized World Ocean Database

[7] http://www.iode.org
[8] http://ioc-unesco.org/
[9] http://en.unesco.org/
[10] http://www.iode.org/index.php?option=com_content&view=article&id=465&Itemid=100201

(WOD)[11] and Global Oceanographic Data Archaeology and Rescue (GODAR)[12]. WOD and GODAR have stimulated much international exchange of historical and modern oceanographic data, development of quality control procedures, and integration of research-quality data at local, regional, and global scales. With substantial support from the Government of Flanders (Belgium) and City of Ostend, IOC Project Office[13] for IODE was established in 2005 in Oostende, Belgium to help support the IODE program.

The 23rd session of IODE decided to establish an inter-sessional working group to propose a restructuring of its functions (thereafter IODE restructuring group, IODE-RG). The goal was to help achieve an efficient and optimal use of human and financial resources and better communications of IODE activities to our partners and stakeholders (Decision IODE-XXIII.1)[14]. The timeline was to complete a draft by December 2016 in preparation for the IODE-XXIV Committee meeting in 2017. The initial thrust of this inter-sessional working group was:

- Review the recommendations listed in Document IOC IODE-XXIII/5b (The Future of IODE – Recommendations[15]; see also IODE-XXIII: The Future of IODE - Analysis and Survey Results[16]);
- Review the terms of reference for the IODE structure, projects, and activities to ensure continued relevance to IODE and IOC goals;
- Identify and evaluate the benefits IODE derives from the current structure, projects and activities;
- Evaluate any weaknesses of the current IODE structure, projects, activities, and formulate ways to remedy these weaknesses;
- Propose options for revising the current structure, projects and activities.

Problem Statement

The following question guided our analysis: ***Is IODE presently meeting the needs and requirement of products and services of the international oceanographic community and its***

[11] http://www.iode.org/index.php?option=com_content&view=article&id=371&Itemid=100086
[12] http://www.iode.org/index.php?option=com_content&view=article&id=18&Itemid=100087
[13] http://www.iode.org/index.php?option=com_content&view=article&id=46&Itemid=84
[14] http://www.iode.org/index.php?option=com_content&view=article&id=289&Itemid=100017#decision23.1
[15] http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=14595
[16] http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=14594

stakeholders? The ocean community needs and requirements have changed substantially in the past decade and will continue to change as the need for improved environmental intelligence evolves. There are two interrelated aspects that should be considered. First, IODE has not effectively evolved its capabilities and services to keep with the changing needs and requirements of the oceanographic community that it serves; our primary stakeholders. An IODE operating under limited funding resources and following the business as usual scenario of the recent past few years streamlining its current handling of projects is not an effective, successful, and sustainable strategy. IODE has tried to do too much with too little funds and without an actionable, strategic, and adaptable guiding roadmap. IODE should not be competing with regional or global organizations. Second, IODE needs to consider a more effective community engagement strategy. IODE is more likely to succeed if it empowers and integrates groups and individuals into the mission and role of IODE in the international ocean data management and information community.

It is critically important that IODE improves its international role, credibility, engagement strategy, and leadership particularly in those areas where IODE has strong capacity to support effectively. These areas include facilitating timely open access to the best available scientific oceanographic data and information and facilitating capacity development and training.

A proposed path forward

Moving forward, we propose that IODE places emphasis on developing and coordinating a manageable number of actionable, high-utility strategies that are responsive to the needs of stakeholders, and conducts a more effective community engagement. This requires a common vision of success and clear roles, responsibilities, and accountability measurements. This is also necessary to help ensure that IODE supports the evolving needs of its stakeholders. Specifically, we propose a focused framework for evolving IODE built around the following vision:

- building on its track-proven strengths (*e.g.*, capacity building, training, and information; develop authoritative scientific data and information management standards and best practices; and facilitating full and open access of data and information);
- increasing visibility and enhanced communication (*e.g.*, need to dedicate effort to promoting and sharing with others what IODE does well at the international, regional, and national levels);

- increasing effective deliverables , accountability, and benchmarks of success to its current funded projects (*e.g.*, keep what works, terminating what does not work well based on transparent and open performance metrics);
- using an open and transparent process-oriented peer-reviewed proposal framework to take on future funded projects;
- fostering strategic alliances and synergies with regional and global organizations with overlapping mission roles with IODE (*e.g.*, capacity building, data management, information management, ocean data standards and best practices related to ocean data management and exchange[17], *etc*.);
- increasing IODE stakeholder community engagement and seeking strategic alliance/synergy with international organizations.

To achieve this vision, we propose four themes or strategies:

- **Theme 1:** Evolving IODE: Develop a realistic, adaptable, and decision-making strategic plan. Plan to be refined as needed. This plan needs to align with the high level IOC vision and developing a relevant IODE strategic plan (See Decision IODE-XXIII.2 Inter-sessional working group to revise the IOC Strategic Plan for Oceanographic Data and Information Exchange[18]). This also involves IODE community engagement;
- **Theme 2:** Re-focusing the current IODE management structure[19]. This includes re-defining the role of the IODE Officers; terms of reference (who are they, voting, invited experts, meetings, *etc*.). This also includes deciding on IODE direction/plans aligning with IODE/IOC strategic plan, nominations for next IODE co-chairs, *etc.*;
- **Theme 3:** Develop a process-oriented and peer-reviewed funding cycle for IODE projects and activities. Need to develop metrics for evaluation of projects and activities;
- **Theme 4:** Sustainable: Budget, fundraising needs, need to review ethic rules non-competitive (World Meteorological Organization [WMO] has dealt with this, how it is done at WMO?). Sources of funding that do not violate IOC rules. Need to evolve the needs of IODE and not advance individual interests. Team will need guidance from IOC legal affairs. How could IODE invite other agencies and institutions to invest in common projects and activities?

Realizing this vision will benefit from IODE Member States sustained participation and support.

[17] http://www.oceandatastandards.org/

[18] http://www.iode.org/index.php?option=com_content&view=article&id=289&Itemid=100017#decision23.2

[19] http://iode.org/index.php?option=com_content&view=article&id=10&Itemid=100064

Who are the IODE stakeholders?

Historically, the primary goals of IODE have been to serve the needs of the IODE community (stakeholders) in 4 areas:

a. Coordination of ocean data and information management for international data and information access
b. Coordination with other international programs with major data and information management components
c. Coordination of national ocean information services, and
d. Capacity building in data and information management

The above areas of operations are generally delivered through the IODE Project Office, and through member's national activities and resource contributions. The IODE (Project Office and member activities) pursues several objectives

a. Global activities[20]: Global projects or activities are implemented by many IODE experts through their national oceanographic data center, marine library, Associated Data Unit (ADU)[21], or through the IOC Project Office for IODE.
b. Regional activities[22]: IODE's regional program focuses on capacity building related to oceanographic data and information management in a regional context
c. Support to IOC and WMO programs[23]: Through this objective the IODE, both at the international level (through IODE projects and other program activities) as well as at the national level (through the IODE National Oceanographic Data Centers, Marine Libraries, ADU) provides data and information management services in the areas of ocean science, ocean observations, tsunami warning and mitigation, coastal area management, and marine information management.
d. Training and education[24]: To assist Member States to acquire the necessary capacity to manage marine data and information and become partners in the IODE network.

[20] http://www.iode.org/index.php?option=com_content&view=article&id=15&Itemid=54
[21] http://www.iode.org/index.php?option=com_content&view=article&id=373&Itemid=100089
[22] http://www.iode.org/index.php?option=com_content&view=article&id=43&Itemid=55
[23] http://www.iode.org/index.php?option=com_content&view=article&id=69&Itemid=111
[24] http://www.iode.org/index.php?option=com_content&view=article&id=44&Itemid=82

e. Data and information portals (access)[25]: Compiling a list of ocean data sources developed and maintained by IODE National Oceanographic Data Centers and Online Repositories of marine information (Clearinghouse)
f. Support of Ocean Biogeographic Information System (OBIS)[26]:

IODE support to IOC

IODE is a subsidiary body of IOC and supports the IOC objectives outlined in their most recent 2013-2016 IOC Strategy document[27]. They are:

a. Healthy ocean ecosystems and sustained ecosystem services.
b. Effective early warning systems and preparedness for tsunamis and other ocean-related hazards.
c. Increased resiliency to climate change and variability and enhanced safety, efficiency and effectiveness of all ocean-based activities through scientifically-founded services, adaptation and mitigation strategies.
d. Enhanced knowledge of emerging ocean science issues.

IODE contributes to all of the above IOC objectives in one form or another. The IOC medium-term strategy divides the tasks of reaching objectives into 6 areas; IODE figures prominently in many of the IOC capacity activities[28]:

a. ocean research
b. observing system / data management
c. early warning and services
d. assessment and information for policy,
e. sustainable management and governance, and
f. capacity development.

IODE support to International Programs

International cooperation is needed to undertake measurements at global-scales. These data and information products represent a significant public investment to supplement global

[25] http://www.iode.org/index.php?option=com_content&view=article&id=178&Itemid=141
[26] http://www.iobis.org/
[27] http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=11565
[28] http://www.iode.org/cdstrategy

environmental intelligence on our changing planet. There are many international programs in which IODE provides support, for example, the Joint IOC/WMO Technical Commission for Oceanography and Marine Meteorology (JCOMM)[29], the IOC and the Aquatic Sciences and Fisheries (ASFA)[30] network, the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC)[31]; and the International Council for Science (ICSU)[32] World Data System (ICSU WDS)[33].

IODE collaborates with JCOMM through the JCOMM Data Management Program Area (DMPA)[34] and its JCOMM/IODE Expert Team on Data Management Practices (ETDMP)[35] to implement and maintain a fully integrated end-to-end data management system across the marine meteorology and oceanographic community. At present, a previous IODE Co-Chair also chairs the JCOMM Data Management Coordination Group (DMCG)[36].

IOC and IAMSLIC established a Memorandum of Agreement on General Cooperation in 2011 to strengthen cooperation between both organizations in the field of marine information management through (i) providing training and support to build human capacity related to marine information management; (ii) promoting networking of marine information managers; and (iii) promoting the capacity of libraries and information centers to disseminate and provide access to, marine scientific literature for the benefit of marine scientists and other relevant users. The Joint IODE/IAMSLIC Group of Experts on Marine Information Management aids in the development of the IODE OceanTeacher[37] initiative by identifying a number of resource persons who will contribute content and lecturers, promote the activities of IOC/IODE's marine information management (MIM) activities and collaborates with IODE on the further development of the IAMSLIC Aquatic Commons e-repository. In turn, IODE hosts the Aquatic Commons Repository for IAMSLIC and provides technical assistance to the repository. IODE provides IAMSLIC membership opportunities to the Marine Information Members of IODE to

[29] http://www.jcomm.info/
[30] http://www.fao.org/fishery/asfa/en
[31] http://www.iamslic.org/people/committees-taskforces/iamslic-iou-mou
[32] http://www.icsu.org/
[33] http://www.icsu-wds.org/
[34] http://www.jcomm.info/index.php?option=com_content&view=article&id=152&Itemid=100024
[35] http://www.iode.org/index.php?option=com_content&view=article&id=59&Itemid=100052
[36] http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=117
[37] http://classroom.oceanteacher.org/

assist in common networking and educational goals and encourages IODE Marine Members to participate in IAMSLIC meetings.

The ICSU WDS promotes long-term stewardship of, and universal access to, scientific data and data services, products, and information across a range of disciplines. ICSU and IODE have been partners since the early 1960s through the ICSU system of World Data Centers (WDCs) (especially the WDCs Oceanography in Silver Spring, USA; now called World Data Service for Oceanography[38]; Obninsk, Russian Federation; Tianjin, China). In February 2013 ICSU and IOC/IODE signed a Letter of Agreement which defines the conditions under which IODE will contribute to the ICSU WDS as a Network Member. The World data Service (WDS) for Oceanography is one component of a global network of discipline sub-centers that facilitate international exchange of scientific oceanographic data and hosted by NOAA's National Centers for Environmental Information (NCEI)[39]. NCEI consolidates the former U.S. National Oceanic and Atmospheric Administration (NOAA)[40] National Climatic Data Center (NCDC), National Geophysical Data Center (NGDC), and National Oceanographic Data Center (NODC).

Present IODE Objectives

The main objectives of the IODE Program are (revision IODE-XXII, March 2013)[41]:

a. To facilitate and promote the discovery, exchange of, and access to, marine data and information including metadata, products and information in real-time, near real time and delayed mode, through the use of international standards, and in compliance with the IOC Oceanographic Data Exchange Policy for the ocean research and observation community and other stakeholders;
b. To encourage the long term archival, preservation, documentation, management and services of all marine data, data products, and information;
c. To develop or use existing best practices for the discovery, management, exchange of, and access to marine data and information, including international standards, quality control and appropriate information technology;
d. To assist Member States to acquire the necessary capacity to manage marine research and observation data and information and become partners in the IODE network;

[38] https://www.nodc.noaa.gov/worlddatacenter/
[39] https://www.ncei.noaa.gov/
[40] http://www.noaa.gov/
[41] http://www.iode.org/index.php?option=com_content&view=article&id=385&Itemid=34

e. To support international scientific and operational marine programs, including the Framework for Ocean Observing for the benefit of a wide range of users.

These objectives are set by IODE members and so reflect the range of operations and services that they expect to receive through their participation in IODE. Membership is voluntary. The responsibility of an IODE member is that they contribute to international activities as they are able, in exchange for activities and services conducted by IODE that benefit them.

Data and Information Users

The IODE system forms a worldwide service oriented network of National Oceanographic Data Centers (NODCs), Marine Science Libraries and Information Centers, Associated Data Units (ADU)[42], and it collaborates closely with the ICSU and WDS resulting in IODE acceptance as a network member of WDS. During the past 50 years, IOC Member States have established 80 oceanographic data centers and 55 National Centers for Marine Information in IOC Member States. The IODE ADU is intended to bring other marine science and information institutions in the wider ocean research and observation communities as key stakeholders of the IODE network.

Other members of this group include researchers (who also contribute environmental data and information), governmental organizations, and public and private sector agencies. Their interests are usually quite focused, the services they require are often time dependent, and they may or may not be well informed of the scope of national and international ocean data and information activities. If they contact IODE, they expect well informed answers to their questions, and easy access (directly or through pointers) to the international groups that can directly answer their questions.

Theme 1: Evolving IODE: Developing a realistic and decision-making strategic plan.

[A] Background and Problem statement:

Recalling the initial idea of establishment of IODE as one of the most important programs of IOC at its beginning stage, the essential role of IODE is to promote international oceanographic data and information exchange based on the secure archival and workable dissemination system of

[42] http://www.iode.org/index.php?option=com_content&view=article&id=373&Itemid=100089

oceanographic data and information, by fully taking into account the changing needs of international ocean sciences and services activities.

IODE has been evolving since its establishment in 1960s, and trying to meet the scientific and societal needs, which have changed as time goes. For example, climate change became one of the most crucial problems in the international not only oceanographic but also political community since 1980s, and IODE initiated several projects in close cooperation with related organizations and programs to meet the requirements of global climate studies, including Global Temperature and Salinity Profile Program (GTSPP)[43], Global Oceanographic Data Archaeology and Rescue (GODAR)[44], and many other activities. While the climate issue is still emerging, societal needs have also been raised such as disaster prevention, tsunami early warning and mitigation system, conservation of biodiversity, and coastal zone management and marine spatial planning.

In 2015 UN adopted the new Agenda 2030 with Sustainable Development Goals (SDGs), in particular, the SDG-14[45] calling to "conserve and sustainably use of the oceans, seas and marine resources". And most recently, the Group of Seven (G7) of industrialized democracies Science and Technology Ministers' Meeting agreed and released the Tsukuba Communique[46], which clearly stated 'The Future of the Seas and Oceans' as one section. The section described actions to take "Promote open science and the improvement of the global data sharing infrastructure to ensure the discoverability, accessibility, and interoperability of a wide range of ocean and marine data".

Having considered these recent trends in the international policy of high level, together with the continuous needs in ocean sciences and services, IODE should effectively meet these requirements by improving its structure and ways of management in more strategic viewpoint. The number of projects in the IODE framework, for example, exceeds thirty (30) as of 2016, which may have caused less monitoring their progress, less communications between the Secretariat and projects, and in some cases duplicated activities to be avoided.

[43] http://www.iode.org/index.php?option=com_content&view=article&id=19&Itemid=58
[44] http://www.iode.org/index.php?option=com_content&view=article&id=18&Itemid=100087
[45] http://www.un.org/sustainabledevelopment/oceans/
[46] http://www8.cao.go.jp/cstp/english/index.html

[B] Recommendation:

The IODE strategy will have three recommended layers; i) Purpose, ii) Strategies, and iii) Engagement. The IODE Purpose should meet IOC's high level objective(s), and IODE Strategies should be defined to achieve the IODE Purpose. The IODE Engagement needs to be designed to accomplish the IODE Strategies and Purpose.

IODE purpose

> "enhance marine research, exploitation and development, by facilitating the exchange of oceanographic data and information between participating Member States, and by meeting the needs of users for data and information products[47]"

IODE strategies

> Use a manageable number of actionable, impact-based, relevant strategies that align with the purpose of IODE. Suggested strategies are described below. Each strategy should take into account stakeholders needs based on an IODE survey/review.

IODE engagement

> Improve contributions of IODE Member States in IODE objectives through shared responsibilities and actions.

Recommended IODE Strategy 1: Facilitate international open data and information sharing mechanisms and ensure secure archive of data and information.

Path forward examples:

- Help establish mechanism ensuring full and open access of data, metadata, and information at the international level with minimum delay and at minimum cost of reproduction (*i.e.*, Global Earth Observation System of Systems [GEOSS] data sharing principles).

[47] http://iode.org/index.php?option=com_content&view=article&id=385&Itemid=34

- Maintain the data and information network consisting of NODCs and other bodies related to IODE including World Data System (WDS) of ICSU to help provide worldwide secure archival system.
- Play proactive roles in data and information sharing through its engagement in oceanographic research and services communities such as attendance at meetings and conferences to illustrate and explain IODE activities.

IODE Strategy 2: Develop authoritative scientific data management standards and best practices

Path forward examples:

- Identify stakeholders, improve knowledge of stakeholder needs, better understand how they use the data and apply the information via authoritative data standards (*e.g.*, IODE/JCOMM Ocean Data Standards process[48]) and open and timely data access (IOC Oceanographic Data Exchange Policy, 2003)[49].
- Provide an intergovernmental framework in close collaboration with related organizations in endorsement of these standards.

Recommended IODE Strategy 3: Enhanced membership engagement including capacity building, training, and information

Path forward examples:

- Enhance ocean community knowledge of scientific data management best practices and information through tailored training.
- Increase IODE stakeholder community engagement and interaction.
- Fostering strategic alliances with regional and global organizations with overlapping mission roles with IODE such as Group of Earth Observations (GEO), Global Ocean Observing System (GOOS), Foundations and Charitable Trusts, *etc*.

[48] http://www.oceandatastandards.org/

[49] http://www.iode.org/index.php?option=com_content&view=article&id=51&Itemid=95

Membership in IODE brings with it a responsibility to take an active role in its activities. There are a number of ways members can contribute:

- Members can volunteer to monitor specific international activities bearing on IODE and report on these to the IODE Management Group (see Theme 2) and IODE Committee.
- Ensure that data and information management issues of importance to IODE are well presented and discussed at meetings.
- Volunteer to represent IODE at external fora when such gatherings are taking place in their region.
- Take an active role in IODE discussions and decisions.
- Support IODE projects especially if they align with their national activities.
- Promoting, sharing, and partnering with others the services that IODE does at the international, regional, and national levels.

[C] Implementation plan:

With respect to restructuring of IODE, decisions on a course of action will be taken at IODE-XXIV in 2017. The newly proposed IODE Management Group (IODE-MG) will organize the approved restructuring, and begin the implementation as soon as possible.

A proposed timeline will be as follows;

- IODE-XXIV in 2017: approval of restructuring plan. Implementation as soon as practical and before IODE-XXV in 2019 including approval and start of IODE projects and activities under the new IODE-MG.

[D] Metrics for success:

- All projects under IODE, whether ongoing or being proposed, provide their clear description. This should result in a reduction of number of projects and activities over a few inter-sessional periods. The reduction of the number of projects and activities is not a real target but one of the metrics in terms of better managing relevant IODE projects and activities based on metrics.
- Extra budgetary supports to IODE could increase based on clearer description of projects and activities.

- The number of oceanographic research and service programs and projects in which IODE is involved could be more efficient.

[E] Risks and benefits:

- Risk: This approach may lose some flexibility to respond to fast emergent issues on oceanographic data and information management.
- Benefit: This approach will increase efficiency and decrease redundancy in oceanographic data and information management efforts.

[F] Background references:

Ocean Climate Data Workshop (1992)[50]
IOC Oceanographic Data Exchange Policy (2003)[51]
IODE Review (2005)[52]
IOC Strategic Plan for Oceanographic Data and Information Management (2013)[53]
23rd Session of IODE (2015)[54]
UN Agenda 2030 with Sustainable Development Goals (SDGs, 2015)[55]
G7 Science and Technology Ministers' Meeting 'Tsukuba Communiqué' (2016)[56]

Theme 2: IODE Management Structure

[A] Background and problem statement

IODE is a primary subsidiary body of IOC and is subject to the IOC Rules of Procedure as adopted by the IOC Assembly at its 21st Session through Resolution XXI-4 (IOC/INF-1166). According to Rule 25, the Chairperson of each subsidiary body shall be elected by the body concerned. In the case of IODE two co-chairs are elected at each session of the committee and co-chairs can serve a maximum of two terms (two intersessional periods). The previous IOC

[50] http://www.iode.org/index.php?docID=942&option=com_oe&task=viewDocumentRecord
[51] http://www.iode.org/index.php?option=com_content&view=article&id=423&Itemid=100036
[52] http://www.iode.org/index.php?option=com_content&view=article&id=67&Itemid=100043
[53] http://www.iode.org/index.php?option=com_content&view=article&id=423&Itemid=100036
[54] http://www.iode.org/index.php?option=com_content&view=article&id=416&Itemid=100159
[55] https://sustainabledevelopment.un.org/post2015/transformingourworld
[56] http://www8.cao.go.jp/cstp/english/index.html

Manual (IOC/INF-785, revised 1989) referred to the chair(s) of subsidiary bodies as Officers and up to IODE-XVIII the IODE chair and vice-chair were the Officers of IODE. IODE-XVIII revised the composition of the IODE Officers based on the recommendations of the IODE Review (2005) to include the IODE Chair, IODE Vice-Chair, chairs of groups established jointly with other organizations, and chairs of Group of Experts. In addition, the Committee agreed the WDC Directors and selected regional, scientific or technical experts may be invited to Officers Meetings, if the agenda calls for them.

The IODE Officers recommend how IODE should manage its resources, projects, and activities to the IODE Committee. Currently, the IODE officers are composed of two IODE co-chairs, chairs of Groups of Experts, and previous co-chairs[57]. The current Groups of Experts are Group of Experts on Marine Information Management (GE-MIM) and the Joint JCOMM/IODE ETDMP. Additional representation from IODE projects and activities has been invited to attend the Officers meeting as appropriate. Note that the former IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH)[58] and IODE Group of Experts on OBIS were abolished by IODE-XXIII[59]. The IODE Committee meets every two years and the IODE Officers meet once during the inter-sessional period to review progress of the work plan and budget, update the action sheet based on responses from the projects and activities, identify any issues that need attention, and prepare for the coming IODE committee session. The present composition of the IODE Officers does not encompass the broad IODE objectives and strategies and a new IODE Management Group is critically needed.

[B] Recommendation

It is recommended that the current “IODE Officers” be abolished and replaced with the IODE Management Group (IODE-MG) to be comprised of five people: the current IODE co-chairs (2), one expert on data management (IODE-DM), one expert on information management (IODE-IM), and one previous IODE co-chair. The inclusion of one of the previous IODE co-chairs will provide continuity from preceding sessions. IODE co-chairs, IODE-DM, and IODE-IM experts will be elected by the full Committee of IODE under the existing election procedures. The past IODE co-chair will be selected by the new IODE co-chairs after the election. The Director of the IODE Project Office will support the IODE-MG in the same capacity as for the IODE Officers.

[57] http://www.iode.org/index.php?option=com_oe&task=viewGroupRecord&groupID=64&Itemid=46
[58] http://www.iode.org/index.php?option=com_content&view=article&id=60&Itemid=101
[59] http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=14791

The IODE-MG will work by email or video conference as appropriate. They should meet once every three months or as appropriate and may meet face-to-face once during the intersessional period. The IODE-MG may invite Subject Matter Experts (SME) and observers to meetings to provide advice via video conference, email, *etc*. The IODE-MG has the authority to appoint by consensus an interim IODE-IM or IODE-DM member should the existing one be unable to fulfill his/her duties.

The IODE-MG will be responsible for reviewing progress of the work plan and budget approved by the IODE Committee and adjusting as required. The IODE-MG will also oversee the assessment of IODE projects and activities and recommend their endorsements which meet the agreed evaluation criteria. Prior to each intersessional meeting of the IODE-MG, the IODE Projects and Activities leads will provide written submissions describing:

- activities implemented since the last IODE session
- results achieved
- problems experienced and measures taken
- status of their approved work plan and budget
- any actions requested from the IODE-MG

Representatives from IODE projects and activities may be invited to attend the IODE-MG meeting if required. The IODE Project Office Secretariat will provide financial and technical support to the meetings of the IODE-MG as appropriate and within resources.

IODE Management Group (IODE-MG) Roles and Responsibilities

IODE co-chairs (shared):

- Chair IODE sessions and intersessional meetings of the IODE-MG.
- Manage the progress of IODE implementation throughout the term of office.
- Ensure timely and complete production of documentation for meetings.
- Consult with and oversee activities of the IODE Project Office.
- Represent IODE at meetings of other groups.
- Respond to other demands

Data Management (IODE-DM) member:

- Advice co-chairs concerning overall IODE matters.

- Represent IODE in JCOMM DMPA management
- Represent IODE on external data management groups as needed (*e.g.* Ocean Observations Panel for Climate [OOPC], Global Ocean Observing System [GOOS], *etc*.)
- Chair the JCOMM Data Management Coordination Group (DMCG)
- Represent IODE at other fora as the need arises
- Provide data management specific advice to the IODE-MG

Information Management (IODE-IM) member:

- Advice co-chairs concerning overall IODE matters
- Represent IODE on external information management groups (*e.g.* IAMSLIC, ASFA, *etc*.)
- Represent IODE at other fora as the need arises
- Provide information management specific advice to the IODE-MG

IODE past co-chair:

- Provide advice to co-chairs on IODE matters
- Provide continuity to IODE-MG decisions considering past experiences
- Represent IODE at other fora as the need arises

IODE-MG terms

- Co-chairs - elected by IODE committee every 2 years for a 2 year term. Maximum 2 terms.
- IODE-DM, IODE-IM members – elected by IODE committee every 2 years for a 2 year term. Maximum 2 terms. Interim IODE-IM or IODE-DM members can serve in that capacity up to the remaining term of the member replaced until the next election for new members.
- Past co-chair – until new past co-chairs are installed.

Management group decision making:

The IODE-MG reaches decisions by consensus of its members. The group may seek the advice and recommendation of subject matter experts and others as appropriate to achieve its decisions and recommendations.

[C] Implementation plan:

IODE-XXIV in 2017: Approval of restructuring plan. Current IODE co-chairs to meet to recommend the composition of the new IODE-MG to start as soon as practical but no later than 2019. The new IODE-MG should be timely introduced to all IODE members and at IODE XXIV.

[D] Metrics for success:

- Responsiveness of the group to changing community needs for ocean data and information services (seek user stakeholder satisfaction with IODE-MG);
- Overall impact and quality of IODE projects and activities managed;
- Recommending priorities and funding needs/requirements.

[E] Risks and benefits:

- Risk: Current IODE Officers to function effectively providing sound, timely, and relevant recommendations to the IODE committee.
- Benefit: The proposed IODE-MG will help ensure a more balanced and focused implementation of the IODE work plan and strategic vision.

Theme 3: Develop a process-oriented and peer-reviewed funding cycle for IODE projects and activities

[A] Background and Problem statement

Existing and new IODE "projects" and "activities" will benefit from a more effective tracking and oversight process to help ensure that these meet IODE strategic goals and objectives (return on investment). At present, IODE manages over thirty projects as of 2016. Some of the existing projects and activities have been continuous for several years. In some cases, the deliverables and performance metrics are not clearly defined. There is an urgent need to implement a transparent and merit-based benchmark for deciding and reporting what projects and activities IODE should undertake or discontinue as the case might be.

While the work of IODE is currently largely project funded focused, there are no clear definitions of what "projects" and "activities" are and whether these receive IODE funding

and/or IODE project office support. Currently, some projects and activities receive IODE funding while others do not. To remedy this ambiguity, we propose to adopt the following terminology for IODE projects and activities.

- IODE project: A temporary effort with limited duration (*e.g.*, 1-2 years) requiring in whole or in part IODE financial funding and project office management in-kind support. Projects can be renewed using a new proposal application process at the discretion of the IODE-MG.
- IODE activity: A temporary effort with limited duration (time limit dependent on objectives) requiring only IODE project office management in-kind support (*e.g.*, IODE staff support) with a defined objectives or purpose. Activities can be in the form of institutional endorsements that draw favorable attention to IODE as an organization, and help IODE to explain how it contributes to IOC objectives.

[B] Recommendations

All new and existing projects and activities are expected to undergo an open, transparent, merit-based funding cycle process to help ensure that these are results driven and that these meet IODE objectives. Projects seeking IODE funding are expected to identify additional external co-funding.

All approved IODE projects and activities, new, and existing, are expected to meet and aligned with IODE strategic goals and submit documented annual progress reports to the IODE-MG. Annual project and activity reports with required information to evaluate degree of progress shall be submitted (i) one month prior to each IODE session with a summary to be presented to the IODE session, and (ii) twelve months after each IODE session. All projects are time limited to 2 years requiring a new proposal renewal process at the end of the second year.

A simple process is indicated below for both new and existing projects and activities: The IODE community will be invited to formulate one or more proposals using a standard template. Below we indicate a list of recommended elements that could be included in the standard proposal template. There shall be timely open-season announcement online and via email for proposing projects and activities from the IODE community (communication engagement). Anyone from the IODE community can apply or propose activities and projects. All projects and activities approved shall be made known to the IODE community in a timely and open manner (*e.g.*, posted online).

It is recommended that the IODE-MG selects a pool of independent reviewers or subject matter experts from the IODE community and outside of the IODE-MG to provide peer-review comments and recommendations regarding proposed IODE project and activities. In all cases, these proposal reviewers should not be affiliated with the proposed work. Final decisions on what proposals to recommend will be made by the IODE-MG based on a peer-review process and on merit. The end results of the proposal review process will be timely made public.

The IODE Project Office will ensure that announcements of opportunity for IODE activities and projects are conducted in a timely, open, and transparent manner. The IODE Project Office will provide at the request of the IODE-MG timely announcement of new funding proposal cycle (online with deadlines and guidelines).

Process for proposing projects and activities:

The IODE Project Office announces all new funding proposal cycle at the request of the IODE-MG including evaluation criteria, deadlines, format, etc. All new project proposals shall be submitted to the IODE-MG. Project proposals must address the questions posed in the evaluation criteria below (see Evaluation of proposals, fitness for purpose). Only proposals that provide the requested information and are up to 5 pages long will be evaluated. The IODE-MG will constitute the final evaluation and decision panel. Any IODE-MG member directly involved in a proposal or activity will recuse themselves from commenting and the others may select a member of IODE (also unconnected to the project or activity) to replace the member recused.

Suggested template of proposal content elements (projects and activities)

- Proposed title
- Describe the alignment with IODE strategies and vision
- What is the project/activity plan?
- What are the Goals, Objectives, and Deliverables?
- Describe the Methods/Actions
- Describe Timeline/Resources if needed (2-yr max)
- Who is responsible overall for the project/activity, specific roles and responsibilities?
- What are the benefits to the IODE community?
- How will the results be shared with the IODE community?

- Budget and budget justification
- Is there external funding support?
- Optional: External endorsements from the IODE community and stakeholders

It is recommended that the IODE-MG uses the criteria below to evaluate project and activity proposals as appropriate. Projects and activities receiving a recommendation of support from the IODE-MG will be circulated to IODE members through a distribution of the proposal or activity. IODE-MG members will be asked to express opinions, suggestions, and ultimately support or not the proposed project or activity. Non-response will be interpreted as support. A project or activity must receive at least 60% of support from IODE-MG members to be considered for possible recommendation. Thus, if less than 60% of IODE-MG members *(e.g.*, < 3 members) do not support the project or activity, IODE will withhold its endorsement. IODE-MG endorsement does not automatically mean financial or other resources will be made available to the project or activity. This will be decided in the usual budget and other deliberations at IODE sessional meetings.

Proponents will be provided with timely anonymized evaluations and comments received whether or not the project achieves IODE endorsement. Proponents may rework and resubmit proposals according to IODE-MG announcement of opportunity for proposals and activities as appropriate.

Evaluation of proposals (fitness for purpose)

The IODE-MG may use at their discretion the following criteria or modify it as needed to assess the fitness for purpose a project proposal or activity. Each member of the panel will score the proposal with a 4, 2, or 0 points (score) based on their individual evaluation. Scores from all panel members will be added and a project must receive an average score of greater than 60% or more to be considered for recommendation (endorsement) to IODE committee by the IODE-MG. The IODE-MG may organize their final deliberations to have a group or other form of evaluation. The final recommendations shall be made available online to IODE members.

The following proposal evaluation criteria or guideline is recommended:

a. Does the project or activity target one or more IODE objectives? Are there strong arguments to justify this assertion?
   Score: 4. Metric: the arguments are strong and the support is clear,

Score: 2. Metric: the projector activity appears to target one or more objectives, but arguments are weak,

Score: 0. Metric: the project or activity does not seem to support an IODE objective or the arguments are unconvincing.

b. Are there tangible commitments from participating participants and countries?

Score: 4. Metric: commitments are clear and documented by letters of support

Score: 2. Metric: commitments are clear, but documentation is lacking

Score: 0. Metric: commitments are unclear or documentation is lacking

c. Do the project or activity deliverables enhance IODE activities?

Score: 4. Metric: deliverables are easily identified with IODE deliverables?

Score: 2. Metric: deliverables are clear but not easily connected to IODE deliverables

Score: 0. Metric: Deliverables are unclear or do not connect to IODE deliverables

d. Is there strong support from IODE stakeholders for the deliverables of the project?

Score: 4. Metric: there is documented support from, or participation of stakeholders

Score: 2. Metric: there is some weakness in documented support or stakeholders are absent

Score: 0. Metric: support is not documented and stakeholders are absent

e. Are there clear performance metrics for the project?

Score: 4. Metric: metrics are well explained and relevant to evaluating project against deliverables

Score: 2. Metric: some metrics are poorly explained and unclear how they can be used in evaluating performance

Score: 0. Metric: metrics are poorly defined or cannot be used to evaluate performance

f. Does the project need financial or other support from IODE to meet its objectives?

Score: 4. Metric: no support is required

Score: 2. Metric: some non-financial support is desirable

Score: 0. Metric: full financial support is crucial to the project

g. Does the project or activity fill a gap in IODE activities?

Score: 4. Metric: the gap is well described as is how the project addresses it

Score: 2. Metric: the argument that there is a gap is not strong, or the project is now clear how the gap is addressed

Score: 0. Metric: neither the argument of the gap, not the way the project addresses it is well made

h. Is there a strong governance model for the project (e.g., plan is actionable and realistic)?

Score: 4. Metric: the model is well described and appears quite workable given the participants

Score: 2. Metric: the model is well described, but there is some doubt of its workability
Score: 0. Metric: the model is poor

i. Overall, how strong is the project or activity proposal?
Score: 4. Metric: well described, and well received by many IODE members
Score: 2. Metric: well described but has more limited member support
Score: 0. Metric: the proposal or activity did poorly in gaining IODE member support

Evaluation of funded projects (performance criteria)

- Projects and activities will be evaluated once every year based on annual reports. IODE-MG members may choose to serve as an evaluation panel, or nominate expert(s) to carry out the evaluation on their behalf. However the evaluation is done, a concise, written report of results will be available to IODE-MG and IODE members no later than 2 months after the annual reports are received.
- No evaluation panel member may provide an evaluation of a project in which they are involved in any way.
- It is recommended that the IODE-MG or panel use the criteria below to evaluate project and activity performance as appropriate. Results of the evaluation will be anonymized and shared with proponents. Project and activity evaluations will be circulated to IODE members.

Project or activity performance evaluation criteria:

1. Are there annual reports?
   Score: 4. Metric: there are annual reports each year and produced on time
   Score: 2. Metric: there is a gap in annual reporting, or they are delivered later than expected,
   Score: 0. Metric: annual reporting is missing
2. Do the reports explain annual objectives, deliverables, and present measurable results of progress towards them?
   Score: 4. Metric: objectives are clear and mostly documented as achieved
   Score: 2. Metric: objectives are clear but documentation of achievements is weak
   Score: 0. Metric: objectives are poorly stated or achievements are unclear.
3. Are the project objectives still aligned with those of IODE?
   Score: 4. Metric: objectives are still well aligned
   Score: 2. Metric: there is some misalignment that can be corrected

Score: 0. Metric: misaligned with IODE objectives

4. Are proposers still actively engaged based on documentation in the reports?
   Score: 4. Metric: reports document continuing active involvement by participants
   Score: 2. Metric: reports appear to show some fall off in participant involvement
   Score: 0. Metric: involvement by members is importantly reduced.
5. Were the expected results obtained?
   Score: 4. Metric: reports document that the objectives were achieved or likely to be achieved (results driven)
   Score: 2. Metric: reports show partial success but significant success promise to achieve the results
   Score: 0. Metric: reports indicate little measure of success or promise that results will be obtained.

IODE Data Management Actions:

Projects that do not receive a positive recommendation from the evaluation (>60% of maximum score) will be notified of what actions need to be taken to improve performance and an appropriate time frame for improvement.

Projects that receive a negative evaluation will have IODE endorsement withdrawn at the discretion of IODE-MG. The project may not continue to operate unless remedies are put in place. The authors are eligible to propose a new project request for funding.

[C] Implementation plan

IODE-XXIV in 2017: Approval of plan forward. Call for new proposals and activities as soon as practical at the discretion of the proposed IODE-MG but no later than 2019. The IODE-MG will review existing projects and activities based on new proposal description and organize the orderly implementation approval and start of projects and activities under the new system.

[D] Metrics for success

Evaluation of projects and activities: All IODE projects and activities, whether ongoing or proposed, need to provide clear evaluation criteria. Progress report outlines what has been accomplished based on the proposed work up to this point. Final progress report outlines what has been accomplished. Projects and activities that do not provide a final progress report or progress is less than satisfactory with respect to deliverables, then these shall not be

considered for another funding cycle unless clear actionable remedies are put in place. For example, if a project or activity did not make stated deliverables and objectives for which funding and/or IODE Project Office support was made available then this could be considered as a metric for not recommending further support or endorsement

- Measures of success: Seek user stakeholder satisfaction with IODE projects, activities, services, document benefits, *etc*.
- Impacts: What if we do/don't fund this project/activity, sustainability of operations, oversight, funding needs and priorities.
- Societal benefits: Publications produced as a result of this project, value added services, citation metrics (*e.g.*, Digital Object Identifiers [DOI] or other identifiers).

[E] Risks and benefits

- Risk: Striking an appropriate balance between proposal requirements and oversight of project implementation and accountability (but not a cumbersome or unnecessarily lengthy process)
- Benefit: This approach will increase efficiency of IODE projects and activities to address IODE objectives. Offers a transparent, open proposal process that is not cumbersome or lengthy.

[F] Background

IODE has supported many projects and activities, some undertaken by its members and some by the staff of the IODE Project Office on behalf of IODE. Some of these include global (*e.g.*, GODAR, GTSPP, GOSUD, OBIS, World Ocean Database [WOD], and OceanTeacher) and regional (Ocean Data and Information Network) activities.

Theme 4: Sustainable Budget

The IODE program receives approximately US$115,000/year from the UNESCO Regular Programme budget. In addition, the IOC Project Office for IODE receives approximately US$200,000 from the Government of Flanders (direct financial contribution via the Flanders

Marine Institute[60]). The latter is earmarked for capacity building training courses and meetings. We must add that the support provided by the Government of Flanders is dependent upon the willingness of the donor to continue its support. Currently this support is part of a Memorandum of Understanding (MoU) with duration of 4 years, to be renewed next on January 01, 2017.

Additional funding is obtained from extra-budgetary projects (*e.g.*, OceanTeacher Global Academy[61], Caribbean Marine Atlas[62], Development of Information Products and Services [DIPS-4][63], *etc.*). This should not be considered as core funding as IODE projects have specific objectives, activities, and outputs. While they contribute to the objectives of IODE, these funds are not under the control of the IODE Committee. Furthermore, extra-budgetary project funding is limited in time (typically 3-4 years) and cannot be predicted in the long-term. While in the past approximately 10 years, certain Member States would provide un-earmarked contributions that complemented the Regular Programme funding, such contributions have now become very rare.

In addition, while not considered under "budget", we should not underestimate the importance of IODE staff funding needs. At this time IODE is supported by two UNESCO regular programme positions, 3 seconded positions (Government of Flanders through Flanders Marine Institute [VLIZ]) and 4 extra-budgetary positions (funded by projects). Some of these extra-budgetary positions perform core functions within IODE which must be considered at risk as these positions are funded by finite length projects. Also in terms of administrative support staff IODE has 0.25 positions at UNESCO Headquarters and one full-time position in Oostende, funded through a secondment or contribution by the Government of Flanders (through VLIZ). In order to ensure secure and sustained staffing IODE needs at least 1 full-time administrative support assistant and 2 additional UNESCO regular programme positions (one for OBIS and one for IODE general).

To obtain a well justified resource requirement analysis, the IODE Committee should review the current range of IODE data and information services with the view of reducing these to a level that addresses the priority needs of IODE and also the ability of IODE to manage these

[60] http://www.vliz.be/en/node/16
[61] http://www.iode.org/index.php?option=com_content&view=article&id=431&Itemid=100177
[62] http://www.iode.org/index.php?option=com_content&view=article&id=75&Itemid=113
[63] http://www.iode.org/index.php?option=com_content&view=article&id=470&Itemid=100216

844 effectively within current and requested future resource and funding limits. We were unable to
845 conduct this analysis and provide specific recommendations and an implementation plan. We
846 recommend that IODE XXIV establishes an intersessional working group to conduct this task.
847

848 **Acronyms**

849

850 ADU	Associate Data Unit - a structural element of IODE
851 ASFA	Aquatic Sciences and Fisheries Abstracts
852 BUFR	Binary Universal Form for the Representation of meteorological data
853 CMOC	Centres for Marine-meteorological and Oceanographic Climate data (JCOMM)
854 DMCG	JCOMM Data Management Coordination Group
855 DMPA	JCOMM Data Management Programme Area
856 ETDMP	Joint JCOMM/IODE Expert Team on Data Management Practices
857 FAO	Food and Agriculture Organization
858 GCOS	Global Climate Observing System (WMO)
859 GE-BICH	IODE Group of Experts on Biological and Chemical Data Management and
860 Exchange Practices	
861 GE-MIM	IODE Group of Experts on Marine Information Management
862 GEO	Group of Earth Observations
863 GEOSS	Global Earth Observation System of Systems
864 GIS	Geographic Information System
865 GLOSS	Global Sea Level Observing System (JCOMM)
866 GODAR	Global Oceanographic Data Archaeology and Rescue
867 GOSUD	Global Ocean Surface Underway Data
868 GOOS	Global Ocean Observing System
869 GRA	GOOS Regional Alliance
870 GSSC	GOOS Scientific Steering Committee
871 GTS	Global Telecommunications System (WMO)
872 GTSPP	Global Temperature and Salinity Profile Program
873 HAB	Harmful Algal Blooms programme
874 IAMSLIC	International Association of Aquatic and Marine Science Libraries and
875 Information Centers	
876 ICSU	International Council for Science
877 IFLA	International Federation of Library Associations and Institutions

IGOSS	Integrated Global Observing Services System
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange
IODE-MG	IODE Management Group proposed in this report
IODE-DM	IODE Data Management member of the IODE-MG
IODE-IM	IODE Information Management member of the IODE-MG
IODE-RG	IODE Restructuring Group (Decision IODE-XXIII.1)
IOOS	Integrated Ocean Observing System (USA)
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
MCDS	Marine Climate Data System (JCOMM)
MIM	Marine Information Management (IODE)
netCDF	Network Common Data Form
NODC	National Oceanographic Data Centre (IODE)
NOAA	National Oceanic and Atmospheric Administration (USA)
OBIS	Ocean Biogeographic Information System
ODIN	Ocean Data and Information Network
ODINAFRICA	Ocean Data and Information Network for Africa
ODINBlackSea	Ocean Data and Information Network for the Black Sea
ODINCARSA	Ocean Data and Information Network for the Caribbean and South America
ODINCINDIO	Ocean Data and Information Network for the Central Indian Ocean
ODINWESTPAC	Ocean Data and Information Network for the Western Pacific region
ODP	Ocean Data Portal (IODE)
ODS	Ocean Data Standards project (IODE/JCOMM)
OGC	Open Geospatial Consortium
QMF	Quality Management Framework
SCOR	Scientific Committee on Oceanic Research (ICSU)
SDG	Sustainable Development Goals
SG-OBIS	IODE Steering Group for OBIS
SG-OceanTeacher	IODE Steering Group for the OceanTeacher project
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United National Educational, Scientific and Cultural Organization
VLIZ	Flanders Marine Institute (Belgium)

WCRP	World Climate Research Programme
WDC	World Data Centre (ICSU)
WDS	World Data System (ICSU)
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization